Prepared Statement of Mark Myers, Vice Chancellor for Research, University of Alaska Fairbanks

Alaska's outer continental shelf adjoins the Canadian Beaufort Sea on the east, and on the west the Russian Bering and Chukchi Seas. Response capacity and readiness for oil spills in the waters adjoining Alaska's outer continental shelf should be seen in light of the type, probability and potential consequences of a spill. Oil spills in the Arctic could occur from marine shipping accidents from vessels including fishing boats, cruise ships, bulk carriers, cargo ships, or oil tankers. Oil spills could occur from oil exploration wells, production platforms, loading platforms, and oil pipelines. These different sources all carry different risk profiles and response requirements. Spill risk and ability to respond is also controlled by the geology, geography and the ecology of the location.

Marine Shipping

It is expected that Arctic shipping will dramatically increase as sea ice decreases. Based upon recent historical change and coupled oceanographic and atmospheric models it is predicted that the Arctic Ocean will be seasonally ice free by mid-century. This will open up seasonal opportunities for shorter international shipping routes and also create the opportunity to develop increased Arctic tourism, fishing, mining and oil and gas development. With these shipping opportunities will come increased risk of vessel accidents and associated spills. The largest risk to vessels is likely to come from ships that encounter ice conditions that are beyond the ship's capacity to handle. In order to escort or respond to vessels in distress both Canada and Russia have significant Arctic capable ice breaker fleets. The Canadian Coast Guard has a fleet of 7 icebreakers that were built between 1969 and 1987. Russia has a fleet of 28 icebreakers that were built between 1957 and 2007, including 10 that are nuclear powered. In addition Russia intends on constructing 3 new nuclear icebreakers by 2020. In contrast, the United States currently has a fleet of one operational ice breaker with a second under repair and a third planned for decommissioning. In order to prevent shipping accidents Canada continues to work on improving its Arctic Regulatory Shipping Systems including efforts to better monitor and forecast ice conditions including multi-year ice and pressured ice zones. Russia has been investing in container carriers, oil tankers and commercial ships with ice strengthen hulls that are designed to be used without ice breaker escort.

Oil and Gas Exploration and Development in Offshore Areas Adjoining Alaska

To date 89 exploration wells have been drilled in the Canadian Beaufort Sea. No production has occurred. Although oil was found, these wells primarily found significant quantities of natural gas which most likely will not be commercialized without the construction of a natural gas pipeline south through the Mackenzie Valley. These earlier wells were drilled in shallow water on the Beaufort inner shelf. Currently there is renewed interest in drilling for oil on the outer

shelf and continental slope where multiple companies have acquired parcels. Exploration wells drilled on the outer shelf and slope will face some additional challenges from those drilled in shallower water. They are likely to encounter a shorter drilling season due to more severe ice conditions and the use of drill ships rather than bottom founded structures.

Currently no exploration drilling has occurred in the Russian offshore area adjoining the US portion of the Chukchi Sea, however offshore production does occur further south near Sakhalin Island and through a large offshore terminal off Western Siberia. This terminal is in an area that may be ice covered up to 247 days a year. The terminal is supported by auxiliary an ice breaker and an icebreaker tug.

Prevention and Rapid Response to Exploration Spills

Risk of a spill from an offshore exploration well can be dramatically reduced through active prevention. Prevention starts with an in-depth understanding of the geologic conditions to be encountered while drilling. Detailed data collection on shallow hazards such as subsea permafrost, gas hydrates, shallow gas pockets, shallow faults, slope instability, ice scour, and sediment type will help assure that the well is properly designed. Proper design should include the use of redundant levels of protection including best practices in well operations and procedures, logging, casing, cementing and use of enhanced blow out preventers.

Rapid response should greatly reduce the effects of a spill and includes potential for direct injection of subsea dispersants and well capping. It also includes the rapid deployment of containment and mechanical cleaning, and the ability to use in-situ burning, and chemical dispersants when appropriate. Finally, equipment should be available to drill a relief well if necessary.

In order to improve response the Canadian Coast Guard has prepositioned supplies in the Arctic at local communities and does some local training. For the Eastern Beaufort Sea the Canadian producers have formed a nonprofit industry consortium, the Mackenzie Delta Response Corporation.

Arctic Specific Oil Spill Advances in Technology

Some of the challenges associated with responding to Arctic oil spills include very cold temperatures, sea ice, limited daylight hours, lack of infrastructure, remoteness from resources and the unique ecosystem. In order to monitor and track an oil spill a suite of sensors from satellite, aircraft, vessel and buoys are necessary. Emerging use of unmanned aerial vehicles and autonomous underwater vehicles will dramatically improve monitoring and tracking of arctic spills because they can stay deployed for long periods of time and operate under conditions when it is unsafe to used manned systems. Space and airborne radar systems can

locate spills in low light conditions provided the ice cover is not too great. Lidar and electro-optical sensors provide additional capacity. Portable high frequency coastal radar can be used to measure ocean currents and ice movement.

One of the greatest challenges is locating oil under ice. Both airborne ground penetrating radar and the use of oil smelling dogs show promise. Poorly understood and in need of greater research is in the behavior of oil under and within ice.

Techniques for removing oil include containment and mechanical cleaning, in-situ burning, bioremediation, chemical dispersants, and natural recovery. The effectiveness of these various techniques is significantly affected by the percentage of ice cover.

Research Needs

Throughout the Arctic more research is needed in order to develop better predictive models for the movement of sea ice and ocean currents, improved oil spill trajectory models, increased understanding of the behavior and tracking of oil under ice, and better understanding of the impacts to the ecosystem. Stronger integration of data streams and data sharing will be necessary in order to develop the best operational picture. Finally, more large scale field training exercises will be necessary in order to achieve the most efficient operational capacity.